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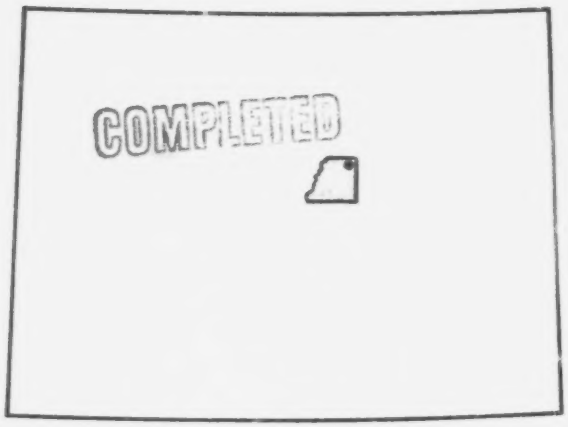
FLOOD INSURANCE STUDY

TOWN OF PARKER, COLORADO
DOUGLAS COUNTY



REVISED: JULY 4, 1989

Federal Emergency Management Agency

COMMUNITY NUMBER - 080310

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

This publication incorporates revisions to the original FIS. These revisions are presented in Section 10.0.

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FLOOD INSURANCE STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Parker, Douglas County, Colorado, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

The Flood Insurance Study was prepared by compiling existing hydrologic and hydraulic technical and scientific data. The data were identified as the best available at the time of compilation of this Flood Insurance Study and should depict the general conditions of the flooding sources with relative accuracy. The Federal Emergency Management Agency (FEMA) performed a cursory review and accepted the data as valid for purposes of this Flood Insurance Study and the NFIP. However, if better information is known to exist or has been developed since the date of this study, the information should be immediately forwarded to the address below for consideration for revision of this study.

Natural and Technological Hazards Division, FEMA
Denver Federal Center, Building 710
Box 25267
Denver, Colorado 80225-0267

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed for the Type 19 Flood Insurance Study for the unincorporated areas of Douglas County, Colorado, (Reference 1).

1.3 Coordination

The following sources were contacted for information during the preparation of the effective Flood Insurance Study for Douglas County (Reference 2).

1. U.S. Soil Conservation Service (SCS)
2. U.S. Geological Survey (USGS)
3. U.S. Army Corps of Engineers (COE)
4. Colorado Water Conservation Board (CWCB)
5. Colorado Department of Highways
6. Colorado State Historical Society
7. Douglas County Planning Director
8. M&I, Inc.

A meeting was held on July 8, 1976, to discuss areas to be studied in the original study for Douglas County and the methods of study to be used. The meeting was attended by representatives of FEMA; the Douglas County Planning and Zoning Department; the Urban Drainage and Flood Control District (UDFCD); and Howard Needles Tammen & Bergendoff, the study contractor.

Subsequent meetings and calls to the Douglas County Planning Director provided pertinent zoning and current development information.

For the restudy for Douglas County, an initial community coordination meeting was held on April 10, 1984, to set priorities for study reaches. The meeting was attended by representatives of FEMA; CWCB; UDFCD; SCS; the Douglas County Planning Department; and J.F. Sato and Associates, Inc., the study contractor. The study area was subsequently modified at the direction of FEMA to include additional reaches to be studied by approximate methods. The final study scope was reviewed with Douglas County Planning and Engineering Department staff at a meeting on September 17, 1984.

An intermediate community coordination meeting for the Douglas County restudy was held on July 29, 1985, to discuss the findings of the study. Representatives of FEMA, CWCB, UDFCD, Douglas County Planning Department, Town of Castle Rock, and the study contractor attended the meeting.

At a meeting on September 30, 1985, FEMA decided that a Flood Insurance Study should be prepared for the newly incorporated Town of Parker using information from the restudy for Douglas County.

On May 16, 1986, the results of the study were discussed at the final community coordination meeting, which was attended by representatives of FEMA, the study contractor, and the community.

All significant problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the Town of Parker, Douglas County, Colorado. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by the overflow of Cherry Creek, Sulphur Gulch, and Tallman Gulch was studied using detailed methods.

The areas studied by detailed methods were selected based on the extent and validity of available hydrologic and hydraulic data.

Jordan Road Tributary and Oak Gulch were studied using approximate methods.

Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

2.2 Community Description

The Town of Parker is located in northeastern Douglas County, in central Colorado.

The population in the Parker census division increased from 3,008 in 1970 to 11,234 in 1980 (Reference 3).

Cherry Creek, which drains an area of approximately 385 square miles, flows northerly to Cherry Creek Lake in Arapahoe County. The main developed areas along the 16-mile study length of Cherry Creek are Franktown and Parker. The development in this area is predominantly agricultural. Cherry Creek and its tributaries are ephemeral streams.

Sulphur Gulch, with a drainage area of 17.1 square miles, flows westerly and passes immediately south of Parker. The entire area through which Sulphur Gulch flows is planned for residential development.

Tallman Gulch, draining an area of approximately 6.1 square miles, flows northwesterly through Douglas County. The area of study is from the confluence with Sulphur Gulch upstream through residentially zoned land.

The climate of the plains area of Douglas County is high, inland continental, modified by the Rocky Mountains immediately to the west and Palmer Lake Divide to the south. Precipitation is light, with an annual average of 15 to 18 inches. Totals vary substantially for individual years because a large part of the yearly total is from summer thunderstorms. Temperatures in the area range from a high of slightly more than 100°F to lows of approximately -35°F. The mean annual temperature is 47°F.

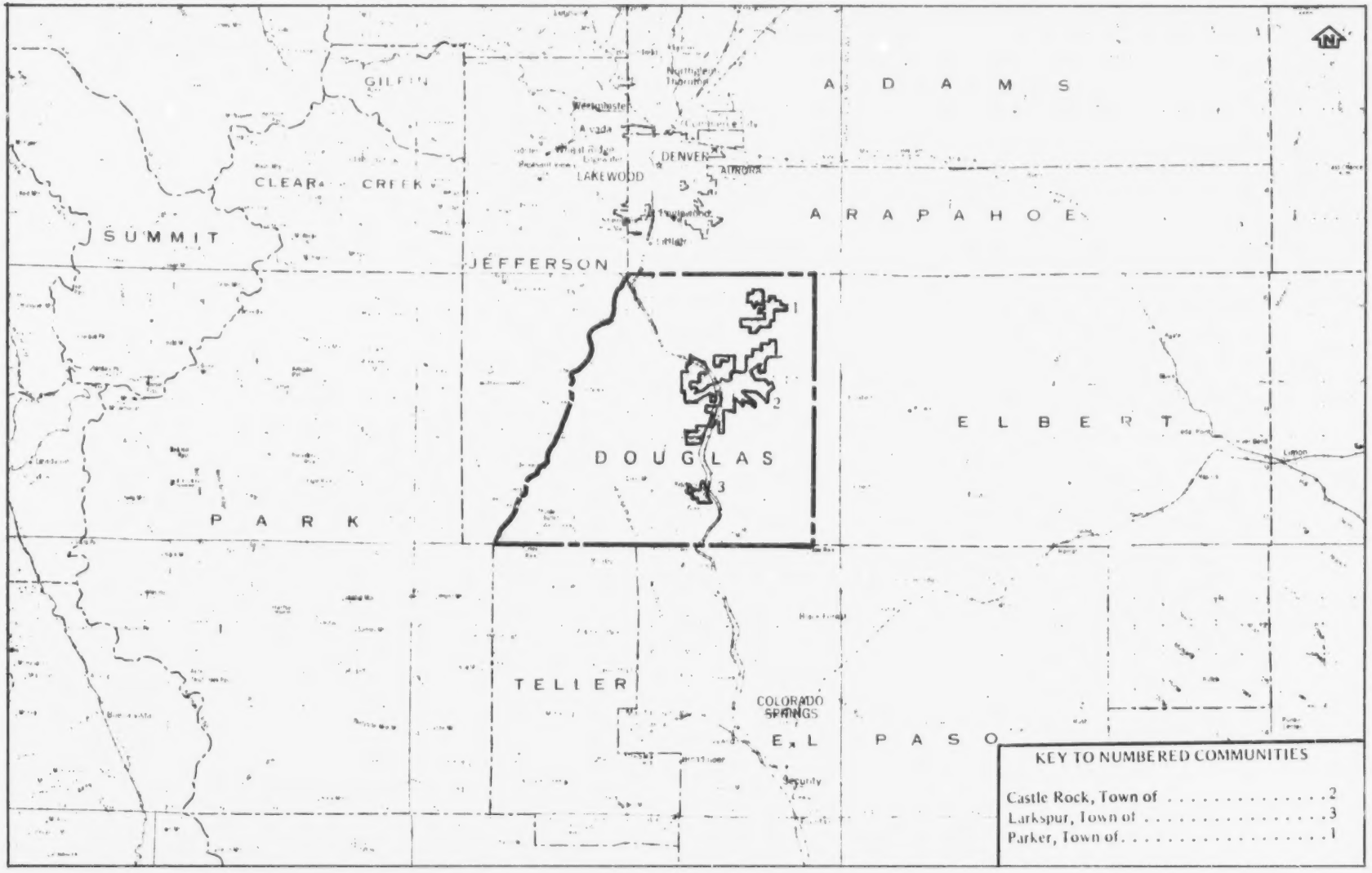


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

APPROXIMATE SCALE

16 0 16 32 48 MILES

VICINITY MAP

The northern one-half of the plains area of Douglas County consists of three basic soil types. Loamy and sandy soils exist on the floodplains and terraces. The terrain in these areas is nearly level to gently sloping to moderately steep, with sandy and gravelly soils on the uplands. Vegetation is mainly grass, with some Gambel oak, mountain mahogany, and ponderosa pine trees (Reference 2). Most of the remaining area is gently sloping to moderately steep, with loamy soils on the uplands.

2.3 Principal Flood Problems

Douglas County is located in an area that is subject to intense rainfall, sometimes as cloudbusts. Floods have resulted from storms covering large areas with heavy general rainfall as well as from storms covering small areas with intense rainfall. Floods generally occur from May through August. The upland areas are characterized by dissected topographic relief and steep stream slopes. Floods are characterized by rapid rises, high maximum discharges, short durations, and comparatively low volumes of total runoff.

The roadways that cross streams and obstruct floodflows are the most significant factor affecting flooding in the area. Other manmade features, such as buildings, cars, and fences, as well as the natural vegetation of the floodplains, cause flow obstruction.

The following accounts of flooding on Cherry Creek in the study area are representative of typical floods for which information is available.

Three floods occurred during May and June 1864. The first, originating in the Cherry Creek and Plum Creek basins, occurred during the nights of May 19-20, 1864, and was caused primarily by a cloudburst in the upper part of those basins. On the morning of May 20, the flood covered the lower portions of Denver with water to depths of from 1 to 5 feet, leaving great deposits of sand and gravel.

Records indicate that 2.08 inches of rain occurred during a 2-hour period on July 14, 1912. The heaviest precipitation occurred between Franktown and a point approximately 5 miles north of Denver, with the center located near Parker. The rainfall started at approximately 3 p.m. and continued until approximately 5 p.m. Cherry Creek crested at approximately 10 p.m. and had a peak discharge of 25,000 cubic feet per second (cfs) in Denver. The Cherry Creek Flood Commission estimated that runoff occurred from an area between Franktown and the site of the existing Cherry Creek Dam and Resrvoir totaled $554,000.

A large storm mass moved into southeastern Colorado on August 25, 1945, and extended over the Cherry Creek basin. Unofficial rainfall amounts varied from 2 to 5 inches. Severe flooding occurred along Cherry Creek in the Franktown-Parker area. The

gaging station at Melvin recorded a peak discharge of 10,700 cfs. Total damages were estimated at $200,000.

A severe storm centered over the Bayou Gulch basin, a tributary to Cherry Creek, during the afternoon of July 28, 1922. Heavy rainfall was reported in the area bounded by lines 3 miles north of Parker, approximately 4 miles west of Cherry Creek, 1 mile south of Franktown, and by the Douglas County limits on the east. Unofficial rainfall amounts varied from 1 to 3.5 inches and occurred in approximately 2 hours. An estimatred peak discharge of 8,700 cfs flowed out of Bayou Gulch. The discharge on Cherry Creek, 3 miles north of Parker, was estimated to be 17,000 cfs. Although no damage occurred in Denver, this was considered a major flood for the upstream part of the basin.

Peak discharges along Cherry Creek were 1,000 cfs upstream from Franktown; 39,900 cfs near Melvin; and 58,000 cfs at Cherry Creek Dam. An estimated peak discharge of 14,100 cfs flowed from Piney Creek, a right-bank tributary of Cherry Creek. During the evening and night of June 16, the Cherry Creek reservoir impounded a flood that had a volume of 16,000 acre-feet. Three of the 18 small dams constructed by the SCS in the upper Cherry Creek basin between Franktown and Parker were filled. Two of these were subsequently overtopped and sustained erosion damage. The remaining structures were outside the area of high-intensity rainfall and received only moderate runoff. The heavy runoff caused major flooding along the main stem of Cherry Creek from the vicinity of Franktown to the Cherry Creek reservoir. Approximately 2,720 acreas were flooded. Most of the bridges across Cherry Creek were either damaged or destroyed. One life was lost during the flood on Cherry Creek. Flood damages totaled approximately $1.3 million.

No floods of consequence have occurred since 1965.

2.4 Flood Protection Measures

The possibility of future flood damage in the upper Cherry Creek areas has been somewhat reduced by the construction of 32 flood-water-retarding structures. The SCS completed construction of these structures in 1965 as part of an overall plan (Reference 4). These structures were designed for an agricultural community with design floods having a 25-year recurrence interval.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1- and 0.2-percent chance,

respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

For Sulphur and Tallman Gulches, the synthetic hydrograph method was used to obtain the peak rates of runoff. The analyses were based on a storm duration of 24 hours and a Type II A distribution, as described in the SCS National Engineering Handbook (Reference 5). The amount of rainfall was obtained from volume III of the Precipitation-Frequency Atlas of the Western United States (Reference 6), and an areal adjustment was applied to convert the point precipitation values to average precipitation over the watershed area. Hydrologic soil cover complexes and associated Runoff Curve Numbers were obtained from field investigations, a soil survey of Castle Rock (Reference 7), an unpublished SCS study of the area, and land use and natural plant cover maps of Douglas County, Colorado (References 8 and 9, respectively). Values of 10, 50-, 100-, and 500-year peak discharges were obtained using the SCS TR-20 computer program (Reference 10). The computed peak discharges compare favorably with the peak discharges estimated using USGS Technical Manual No. 1 (Reference 11).

Discharge magnitudes for Cherry Creek floods were based on an analysis of stream-gaging data at the USGS stream gages located approximately 2.5 miles south of Franktown and 6 miles northwest of Parker. This information was obtained from a COE Floodplain Information Report (Reference 12). Discharge-frequency relationships for the upstream and downstream limits of the study reach were developed using data from the Franktown and Parker stream gages, respectively. The 32 flood-retarding structures in the Cherry Creek basin constructed by the SCS were taken into consideration.

Using two UDFCD reports (References 13 and 14), a discharge-drainage area curve weas developed for streams studied by approximate methods. This method was used for Jordan Road Tributary and Oak Gulch.

Peak discharge-drainage area relationships for the streams studied in detail, Cherry Creek, Sulphur Gulch, and Tallman Gulch, are shown on Table 1.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

For Sulphur and Tallman Gulches, the water-surface profiles for the 10-, 50-, 100-, and 500-year floods were developed using the SCS WSP-2 computer program (Reference 15). These profiles and elevations were compared with historic floods and the flood stages then determined.

Water-surface profiles for floods along Cherry Creek were obtained from the 1975 COE Floodplain Information report (Reference 12).

The water-surface profiles for 10-, 50-, 100-, and 500-year floods on Cherry Creek were developed using the COE HEC-2 step-backwater computer program (Reference 16). The computations were based on channel and floodplain conditions as represented by survey data gathered in April 1975 and as supplemented by later field insvetigations.

Except for portions of Sulphur and Tallman Gulches, cross section data were obtained by field measurements.

All bridges, culverts, and other structures were surveyed to obtain elevation data and structural geometry.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross section locations are also shown on the Flood Insurance Rate Map (FIRM) (Exhibit 2).

Roughness coefficients (Manning's "n" were estimated by field investigation and from pictures of the stream and its floodplain using Roughness Characteristics of Natural Channels (Reference 17), Open-Channel Hydraulics (Reference 18), and Handbook of Applied Hydraulics (Reference 19). The "n" values for Cherry Creek ranged from 0.04 to 0.055 for the channel and from 0.061 to 0.095 for the overbanks. For Sulphur and Tallman Gulches, the "n" values ranged from 0.03 to 0.05 for the main channels and from 0.03 to 0.12 for the overbanks.

For Cherry Creek. the COE used critical depth to detrmine the starting water-surface elevation. For Sulphur and Tallman Gulches, the starting water-surface elevation was determined using the stream slope at a starting valley cross section.

Table 1. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	Peak Discharges (cfs) 10-Year	50-Year	100-Year	500-Year
Cherry Creek					
At West Parker Road	--[1]	8,250	24,640	39,940	124,500
At Stroh Avenue	--[1]	6,610	19,570	31,150	104,200
At Scott Road	--[1]	6,000	17,500	27,120	100,000
Sulphur Gulch					
At Private Road	16.8	2,400	5,000	6,340	10,310
At Parker Road	16.6	2,450	5,080	6,440	10,530
At Pikes Peak Drive	16.5	2,450	5,070	6,430	10,530
At Stonehenge Way	9.6	1,820	3,680	4,640	7,450
At County Road 9	3.4	1,030	1,960	2,460	3,960
Tallman Gulch					
At Seibert Circle	5.8	670	1,310	1,660	2,700
At Seibert Circle	4.6	430	1,060	1,390	2,340
At Unnamed Road	4.5	430	1,060	1,390	2,370

[1]Data Not Available

Calculation of normal depth from field cross section and the estimation of top width was used to plot flooding for approximate study areas.

4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year floodplain boundaries and 100-year floodway to assist communities in developing floodplain management measures.

4.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For Sulphur and Tallman Gulches, the 100- and 500-year floodplain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:24,000, with a contour interval of 10 feet (Reference 20).

Floodplain boundaries for Cherry Creek were taken from the previously referenced COE Floodplain Information report for Cherry Creek-Cherry Creek Lake through Franktown, Colorado, (Reference 12). That study was also used to determine the boundaries at the confluences with the Cherry Creek tributaries included in this study.

The 100- and 500-year floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 100-year floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zone(s) A and AE), and the 500-year floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year floodplain boundaries are close together, only the 100-year floodplain boundary has been shown. Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

Approximate 100-year floodplain boundaries were delineated on the previously referenced topographic maps (Reference 20).

For the streams studied by approximate methods, only the 100-year floodplain boundary is shown on the FIRM (Exhibit 2.)

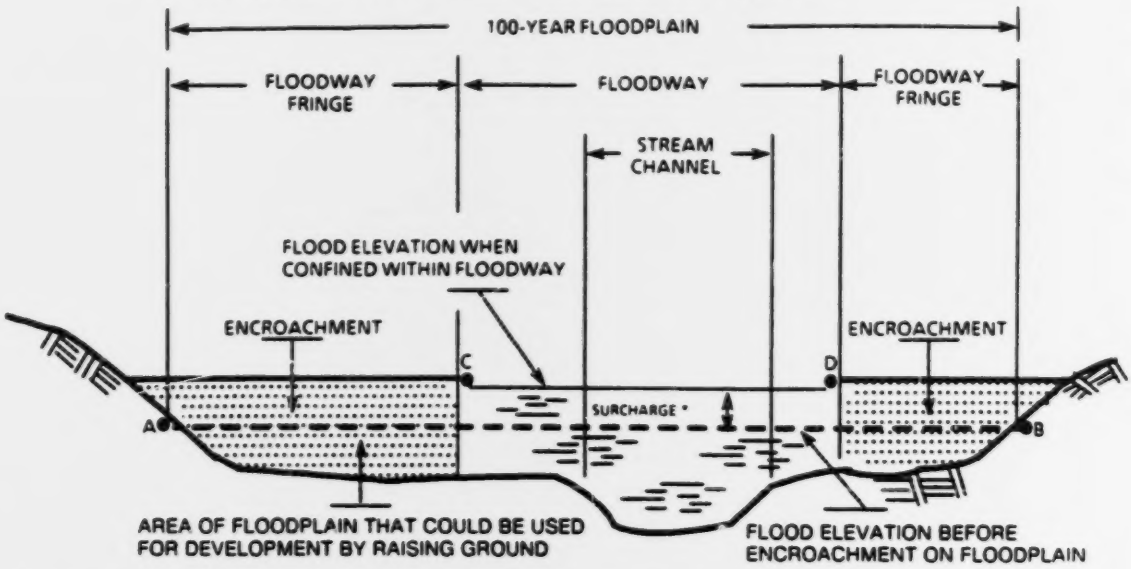
4.2 Floodways

Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities,

and increases flood hazards in areas beyond the encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard. For purposes of the NFIP, a floodway is used as a tool to assist local communities in this aspect of floodplain management. Under this concept, the area of the 100-year floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated at selected cross sections (Table 2). In cases where the floodway and 100-year floodplain boundaries are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and 100-year floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 2.



LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT.
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT.
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

Figure 2. Floodway Schematic

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE[3]
					(FEET NGVD)			
Cherry Creek								
U	124,430	361	3,042	12.6	5,787.1	5,787.5	5,787.5	0.4
V	125,655	304	2,998	12.7	5,794.4	5,794.4	5,795.0	0.6
W	126,810	775	7,447	5.1	5,800.4	5,800.4	5,801.2	0.8
X	127,660	650	4,574	8.2	5,802.6	5,802.6	5,803.1	0.5
Y	128,750	300	3,070	12.2	5,807.8	5,807.8	5,808.4	0.6
Z	129,150	469	3,796	9.8	5,810.7	5,810.7	5,811.2	0.5
AA	130,170	1,045	11,009	3.3	5,816.2	5,816.2	5,817.0	0.8
AB	131,400	550	3,610	10.2	5,818.0	5,818.0	5,818.5	0.5
AC	132,170	625	5,190	7.0	5,823.1	5,823.1	5,823.8	0.7
AD	133,450	900/825[3]	7,050	5.1	5,826.3	5,827.3	5,827.0	0.7
AE	134,310	471[2]	3,422	10.5	5,829.9	5,829.9	5,830.5	0.6
AF	134,780	1,750[2]	9,078	3.9	5,833.6	5,833.6	5,834.4	0.8
AG	135,710	1,250[2]	5,481	6.5	5,835.4	5,835.4	5,835.9	0.5
AH	136,220	525[2]	4,171	8.4	5,837.6	5,837.6	5,838.2	0.6
AI	137,060	979[2]	5,523	6.3	5,841.6	5,841.6	5,842.3	0.7
AJ	137,390	1,231/525[3]	6,123	5.7	5,834.0	5,843.0	5,843.7	0.7
AK	138,575	1,464	9,111	3.8	5,846.1	5,846.1	5,846.9	0.8
AL	139,220	699	3,444	9.9	5,851.2	5,851.2	5,851.2	0.0
AM	140,145	900/200[3]	5,772	5.9	5,855.7	5,855.7	5,856.4	0.7
AN	140,710	692/150[3]	4,459	7.5	5,856.8	5,856.8	5,857.5	0.7
AO	142,030	670[2]	4,418	7.6	5,862.0	5,862.0	5,862.7	0.7
AP	143,245	675/150[3]	4,665	7.1	5,866.7	5,866.7	5,867.4	0.7
AQ	144,500	550	3,844	8.6	5,872.0	5,872.0	5,872.4	0.4
AR	145,270	475	3,457	9.4	5,876.3	5,876.3	5,876.7	0.4
AS	146,545	725	3,980	8.1	5,884.1	5,884.1	5,884.6	0.5

[1]Feet Above Mouth
[2]Floodway Lies Entirely Outside Corporate Limits
[3]Width/Width Within Corporate Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

Parker, Colorado

FLOODWAY DATA

Cherry Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Cherry Creek (Cont'd)								
AT	147,765	642	4,538	7.1	5,891.2	5,891.2	5,891.8	0.6
AU	148,660	600	4,164	7.7	5,894.7	5,894.7	5,895.3	0.6
AV	149,445	535	4,163	7.6	5,898.5	5,898.5	5,899.2	0.7
AW	149,810	769	5,974	5.3	5,900.5	5,900.5	5,901.4	0.9
AX	150,300	736	4,898	6.4	5,901.4	5,901.4	5,902.2	0.8

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

Parker, Colorado

FLOODWAY DATA

Cherry Creek

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE[3]
					(FEET NGVD)			
Sulphur Gulch								
A	800	96	658	9.6	5,819.8	5,820.8	5,820.8	1.0[2]
B	910	85[3]	398	15.9	5,820.4	5,820.4	5,821.4	1.0
C	1,760	144[3]	641	9.9	5,828.1	5,828.1	5,828.1	0.0
D	2,540	120[3]	776	8.2	5,833.5	5,833.5	5,834.5	1.0[2]
E	3,810	260	1,101	5.9	5,844.0	5,844.0	5,845.0	1.0
F	4,518.[5]	180	939	6.9	5,852.7	5,852.7	5,852.7	0.0
G	4,605	156	795	8.1	5,852.7	5,852.7	5,852.7	0.0
H	4,960	335	904	7.1	5,854.5	5,854.5	5,854.5	0.0
I	5,060	351	1,680	3.8	5,856.6	5,856.6	5,857.6	1.0[2]
J	5,520	239	719	9.0	5,859.5	5,859.5	5,859.5	0.0
K	6,415	135	689	8.8	5,866.9	5,866.9	5,867.9	1.0[2]
L	7,110	150	623	9.9	5,873.0	5,873.0	5,973.0	0.0
M	7,170	215	1,395	4.4	5,880.0	5,880.1	5,881.1	1.0[2]
N	8,325	166	583	10.6	5,887.0	5,887.0	5,887.0	0.0
O	8,590	99	398	11.6	5,889.2	5,889.2	5,889.2	0.0
P	8,690	125	896	5.2	5,893.6	5,893.6	5,894.6	1.0[2]
Q	9,415	138	486	9.6	5,898.8	5,898.8	5,898.0	0.0
R	10,150	53	426	11.0	5,913.9	5,913.9	5,914.9	1.0[2]
S	11,300	156	524	8.7	5,927.4	5,927.4	5,928.4	1.0
T	12,815	145	683	6.8	5,941.5	5,941.5	5,942.5	1.0
U	13,900	145	620	7.6	5,954.8	5,954.8	5,955.8	1.0[2]
V	14,955	58	365	12.9	5,964.0	5,964.0	5,965.0	1.0
W	16,000	351	625	5.6	5,976.3	5,976.3	5,976.3	0.0

1Feet Above Mouth
2Encroachment Limited to Channel Banks; Elevation Difference May Be Less Than 1.0 Foot
3Floodway Lies Entirely Outside Corporate Limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

Parker, Colorado

FLOODWAY DATA

Sulfur Gulch

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH[2] (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE[3]
					(FEET NGVD)			
Sulphur Gulch (Cont'd)								
X	16,950	188	448	7.9	5,989.9	5,989.9	5,989.9	0.0
Y	17,755	68	297	11.9	6,004.2	6,004.2	6,004.2	0.0
Z	18,975	140	480	7.4	6,016.2	6,016.2	6,016.2	0.0
AA	19,525	99	408	8.7	6,022.2	6,022.2	6,023.2	1.0[2]
AB	21,005	145	304	8.1	6,041.0	6,041.0	6,041.0	0.0
AC	22,185	84	246	9.9	6,056.9	6,056.9	6,056.9	0.0
Tallman Gulch								
A	460	71	203	8.2	5,891.8	5,891.8	5,891.8	0.0
B	560	83	204	8.1	5,892.7	5,892.7	5,892.7	0.0
C	1,795	25	156	8.9	5,916.1	5,916.1	5,917.1	1.0[2]
D	1,925	130	186	7.4	5,917.8	5,917.8	5,917.8	0.0
E	2,400	55	160	8.6	5,923.4	5,923.4	5,923.4	0.0
F	2,505	73	198	7.1	5,925.0	5,925.0	5,925.0	0.0
G	4,030	142	120	11.6	5,944.5	5,944.5	5,945.5	1.0
H	5,125	142	120	11.6	5,956.6	5,956.6	5,957.6	1.0
I	5,225	424	3,576	0.4	5,968.0	5,968.0	5,969.0	1.0
J	5,825	379	1,514	0.9	5,970.0	5,970.0	5,970.0	0.0
K	7,725	239	896	1.7	5,988.0	5,988.0	5,989.0	1.0
L	9,325	62	173	9.5	6,020.3	6,020.3	6,020.3	0.0
M	10,525	35	187	8.8	6,040.3	6,040.3	6,041.3	1.0[2]

1Feet Above Mouth
2Encroachment Limited To Channel Banks; Elevation Difference May Be Less Than 1.0 Foot

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

PARKER, COLORADO

FLOODWAY DATA

Sulphur Gulch, Cont'd and Tallman Gulch

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations (BFEs) or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year floodplains that are determined on the Flood Insurance Study by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year floodplain, areas within the 500-year floodplain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No BFEs or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use the zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

A 1976 COE Floodplain Information report (Reference 12) includes determination of 10-, 50-, 100-, and 500-year flood discharges and water-surface profiles. This study is based on present conditions; however, the COE data were used to show floodplain boundaries.

In November 1977, Howard Needles Tammen & Bergendoff completed a study (Reference 21) for the UDFCD. The 10-, 50-, 100-, and 500-year flood discharges were calculated for future flood conditions and the 100-year profiles and floodplain limits are shown. The results of this study for Sulphur and Tallman Gulches are based on the present conditions of the study area. Therefore, the results of this study are necessarily different from those of the 1977 study.

Because this Flood Insurance Study has been prepared using information from the Type 15 and 19 Flood Insurance Studies for Douglas County, Colorado (References 1 and 2), the studies are in agreement.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Denver Federal Center, Building 710, Box 25267, Denver, Colorado 80225-0267.

9.0 BIBLIOGRAPHY AND REFERENCES

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2. Federal Emergency Management Agency, Type 15 Flood Insurance Study, Douglas County, Colorado (Unincorporated Areas), September 3, 1980.

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21. Howard Needles Tammen & Bergendoff, Flood Hazard Area Delineation for Happy Canyon Creek, Badger Gulch, Newlin Gulch, Baldwin Gulch, Sulphur Gulch, and Tallman Gulch, November 1977.

10.0 REVISIONS DESCRIPTION

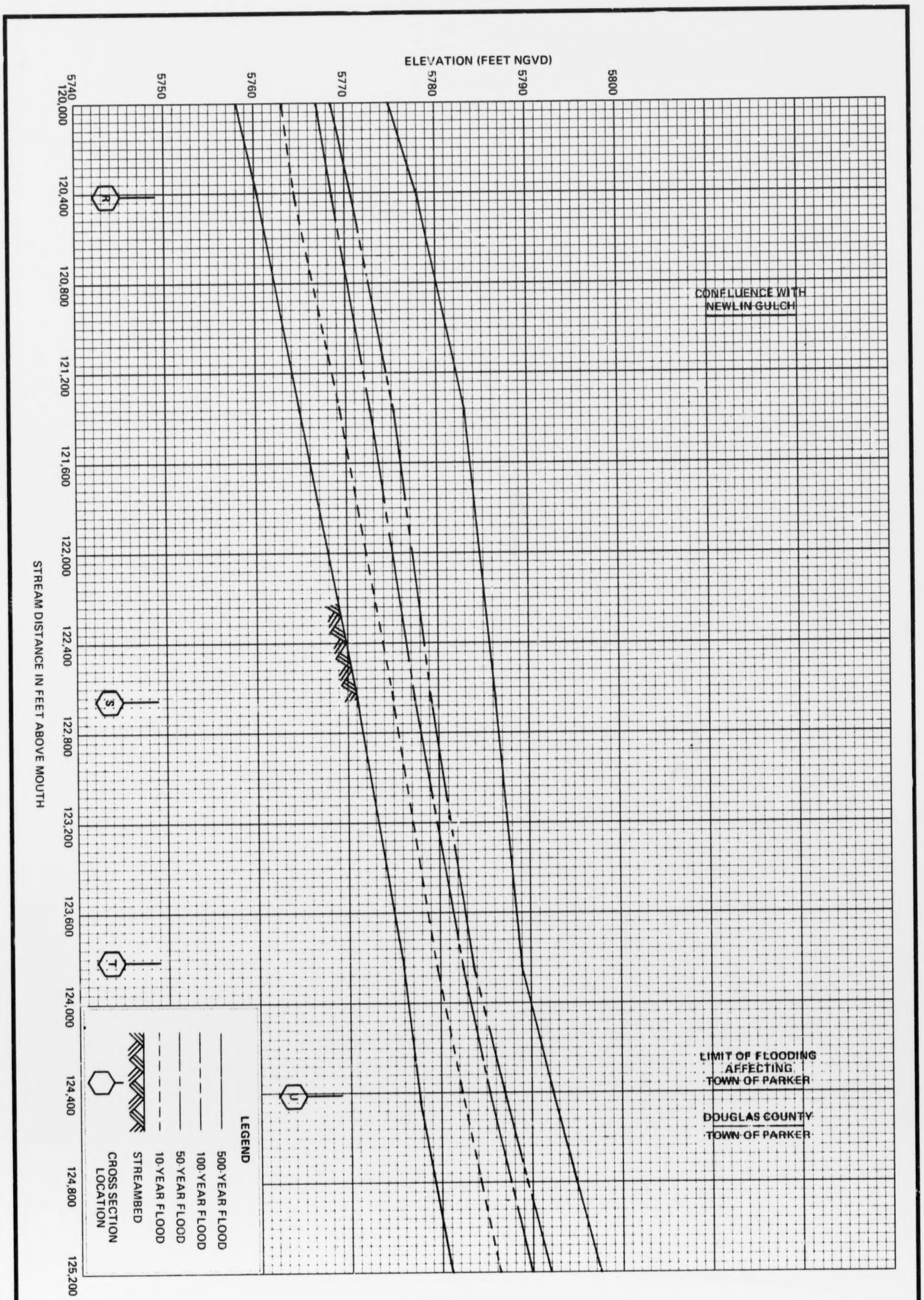
This section has been added to provide information regarding significant revisions made since the original Flood Insurance Study was printed. Future revisions may be made that do not result in the republishing of the Flood Insurance Study report. To assure that any user is aware of all revisions, it is advisable to contact the community repository of flood hazard data located at City Hall, 20120 E. Main Street, Parker, Colorado 80134.

10.1 First Revision

This study was revised on July 4, 1989 to reflect the effects of the new State Highway 83 (Parker Road) Bridge across Sulphur Gulch and overlot grading for property identified as Parker Central Area C-12 property. As a result of these changes, the floodplain and floodway were redefined for a reach of Sulphur Gulch from Pikes Peak Road to a point approximately 1,200 feet downstream. The revised hydraulic analysis for this reach was developed by Greiner Engineering Sciences, Inc., Denver, Colorado, and presented in their technical report, entitled "Sulphur Gulch Letter of Map Revision, Parker General Area C-12, Parker, Colorado," dated August 1987. Profile Panels 08P and 09P and the floodway data table for Sulphur Gulch have also been revised.

New approximate Zone A flooding was added to Tallman Gulch Tributary from its confluence with Tallman Gulch to a point approximately 2,800 feet upstream. The basis for this revision is a technical report, entitled "Flood Hazard Identification Report, Tallman Gulch Tributary 1, Parker, Colorado," prepared by the Department of Natural Resources, Colorado Water Conservation Board, and dated December 1986. This report included the hydrologic and hydraulic analyses for this reach of Tallman Gulch Tributary.

This study also incorporates a Letter of Map Amendment issued on October 12, 1987, for the Saddlebrook Subdivision Filing Number 1 located along Sulphur Gulch. In this letter, Lots 85 through 88, Block 1, and Lots 22 and 23, Block 2, were identified as no longer within the Special Flood Hazard Area, Zone AE, due to the placement of fill. These lots are now located in Zone X. The revised floodplain delineation is reflected on FIRM Panel 0090.



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY TOWN OF PARKER, CO (DOUGLAS CO.)	FLOOD PROFILES CHERRY CREEK

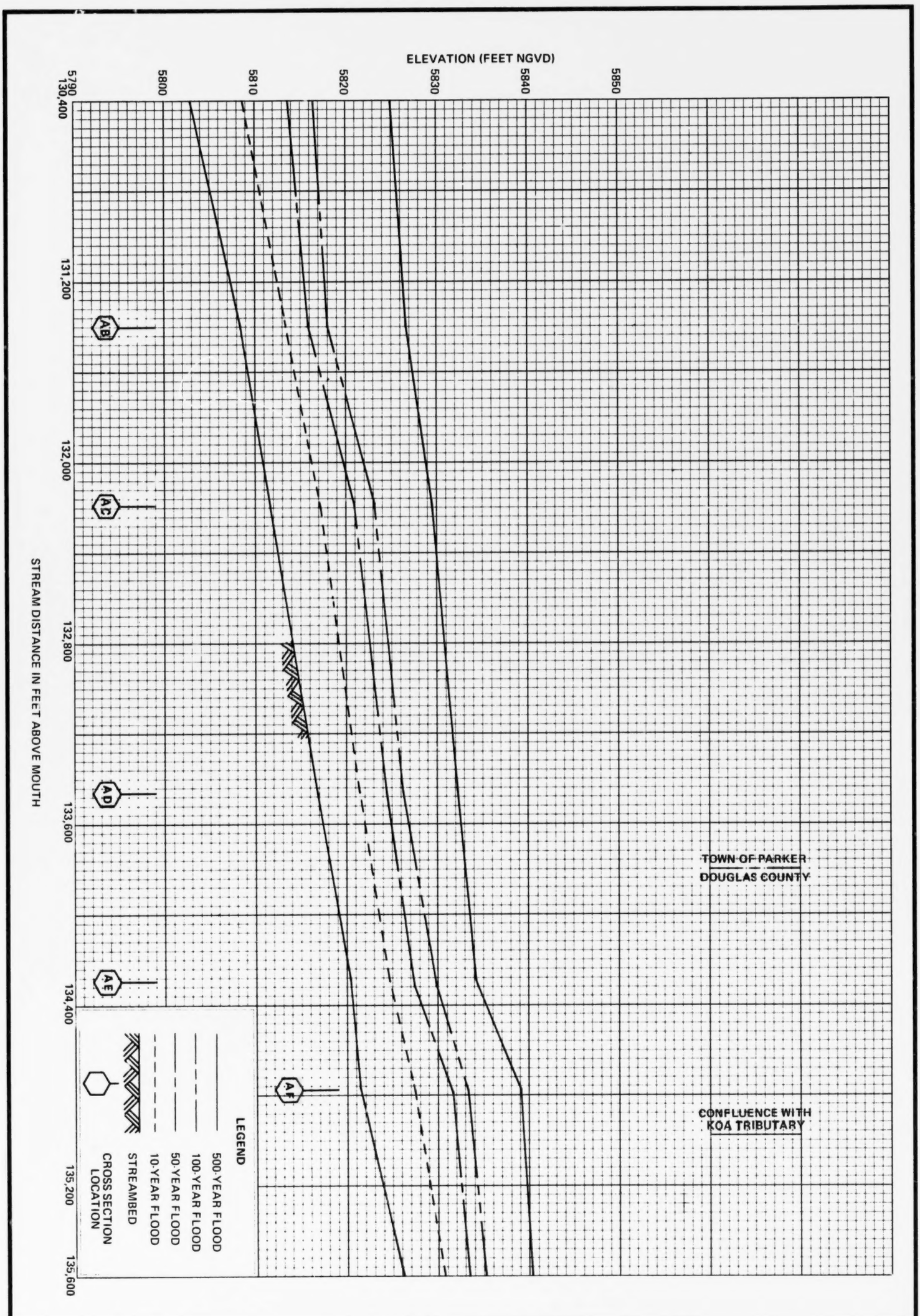
FLOOD PROFILES

CHERRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

02P



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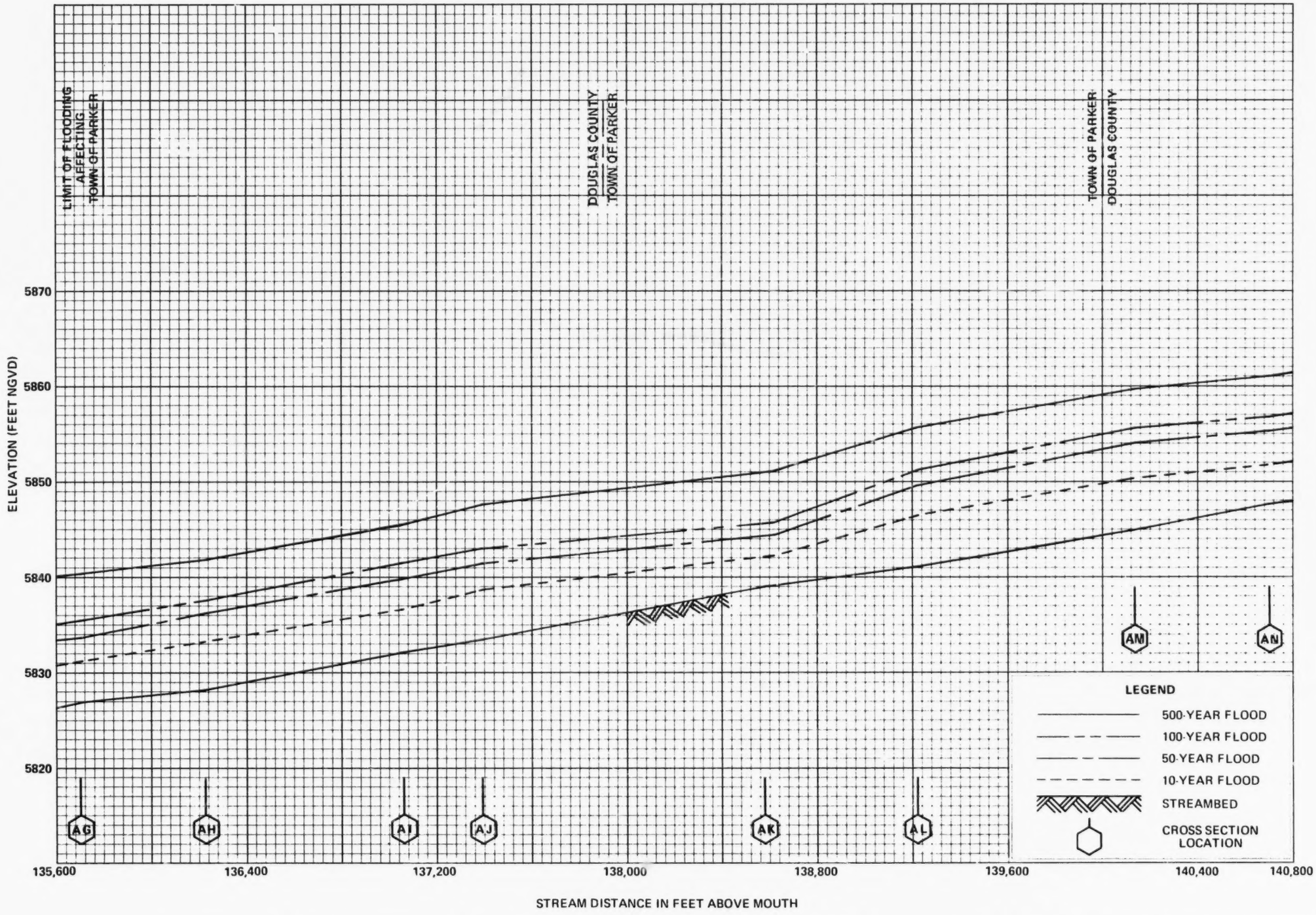


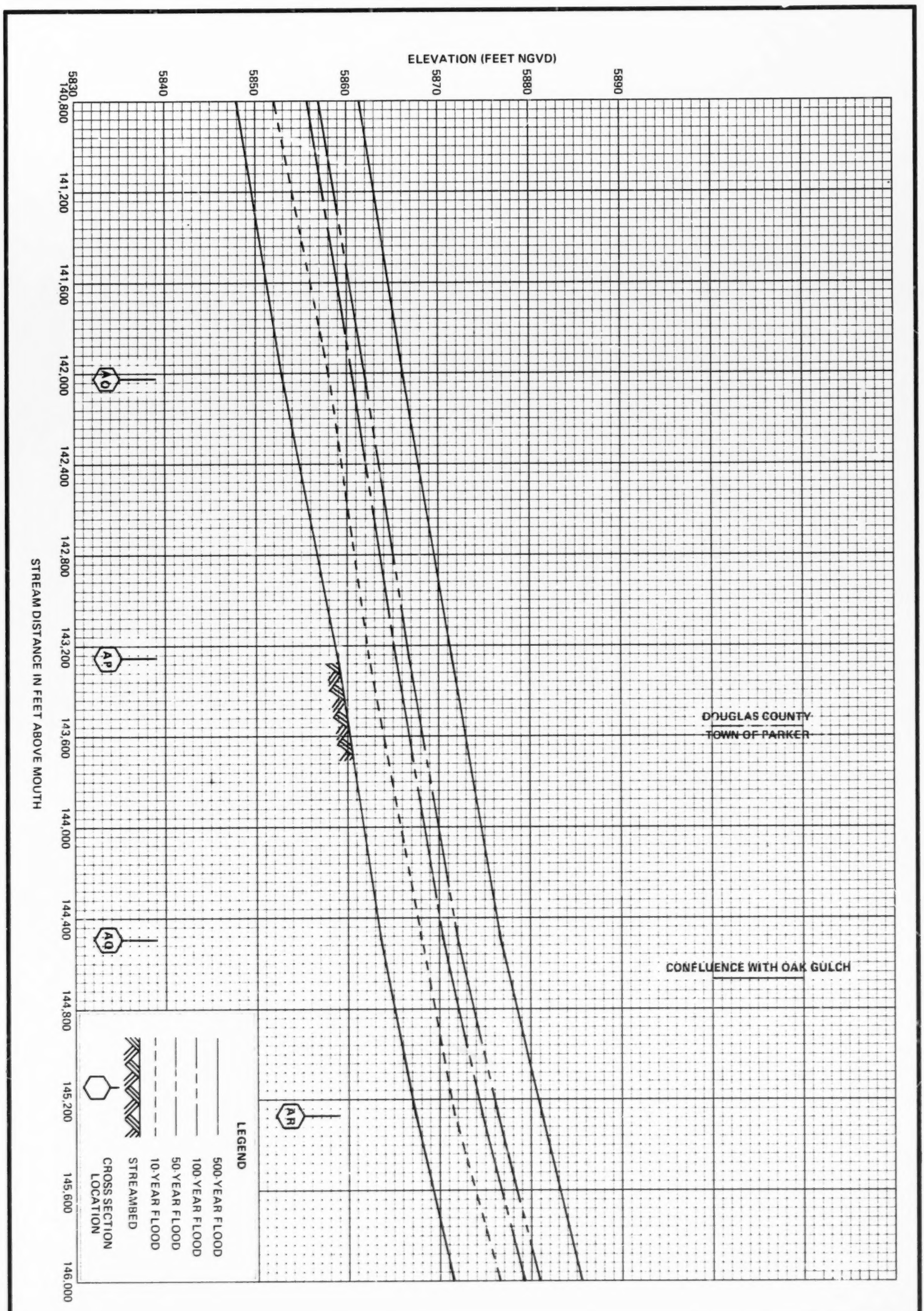
FLOOD PROFILES

CHERRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

04P



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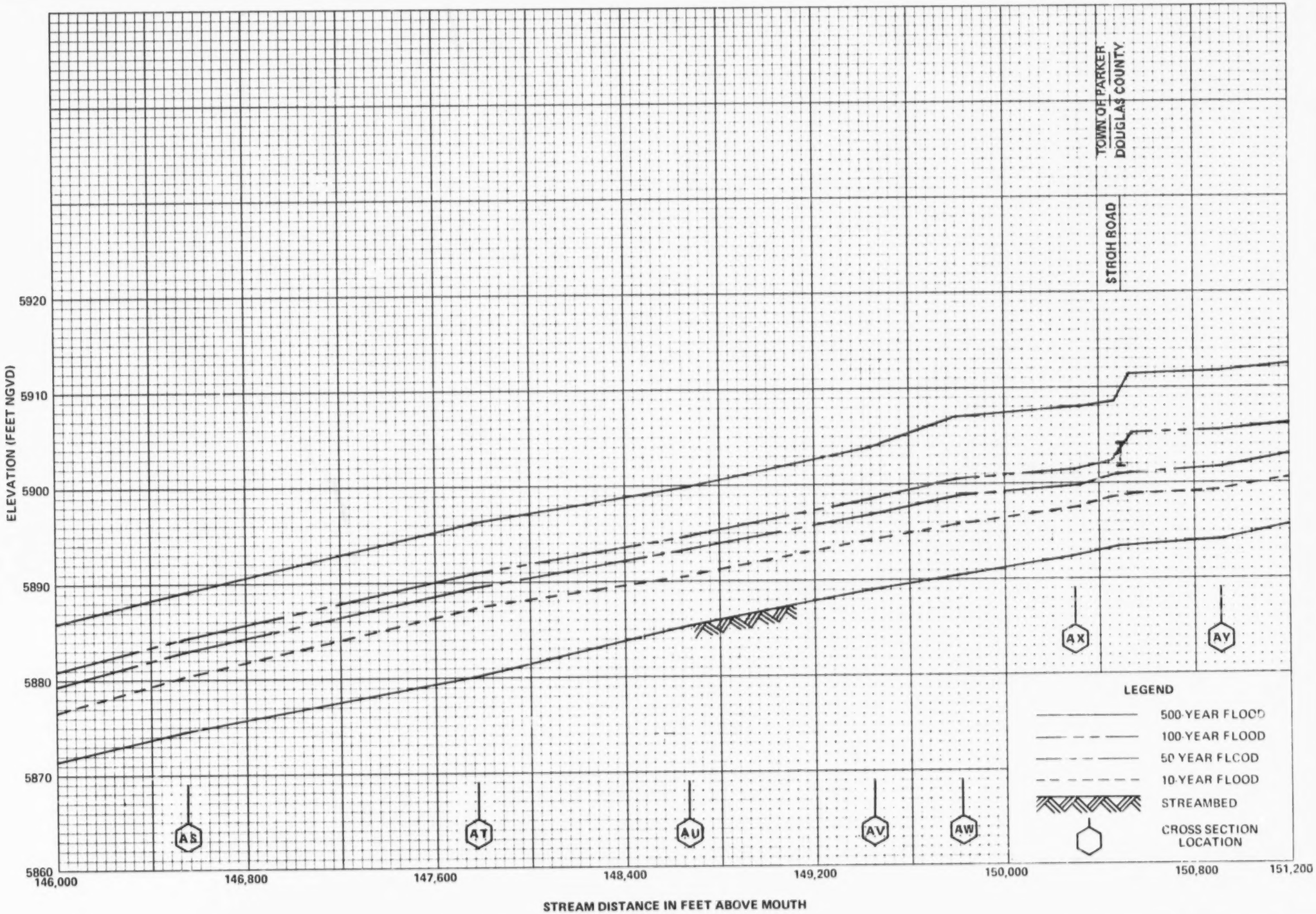


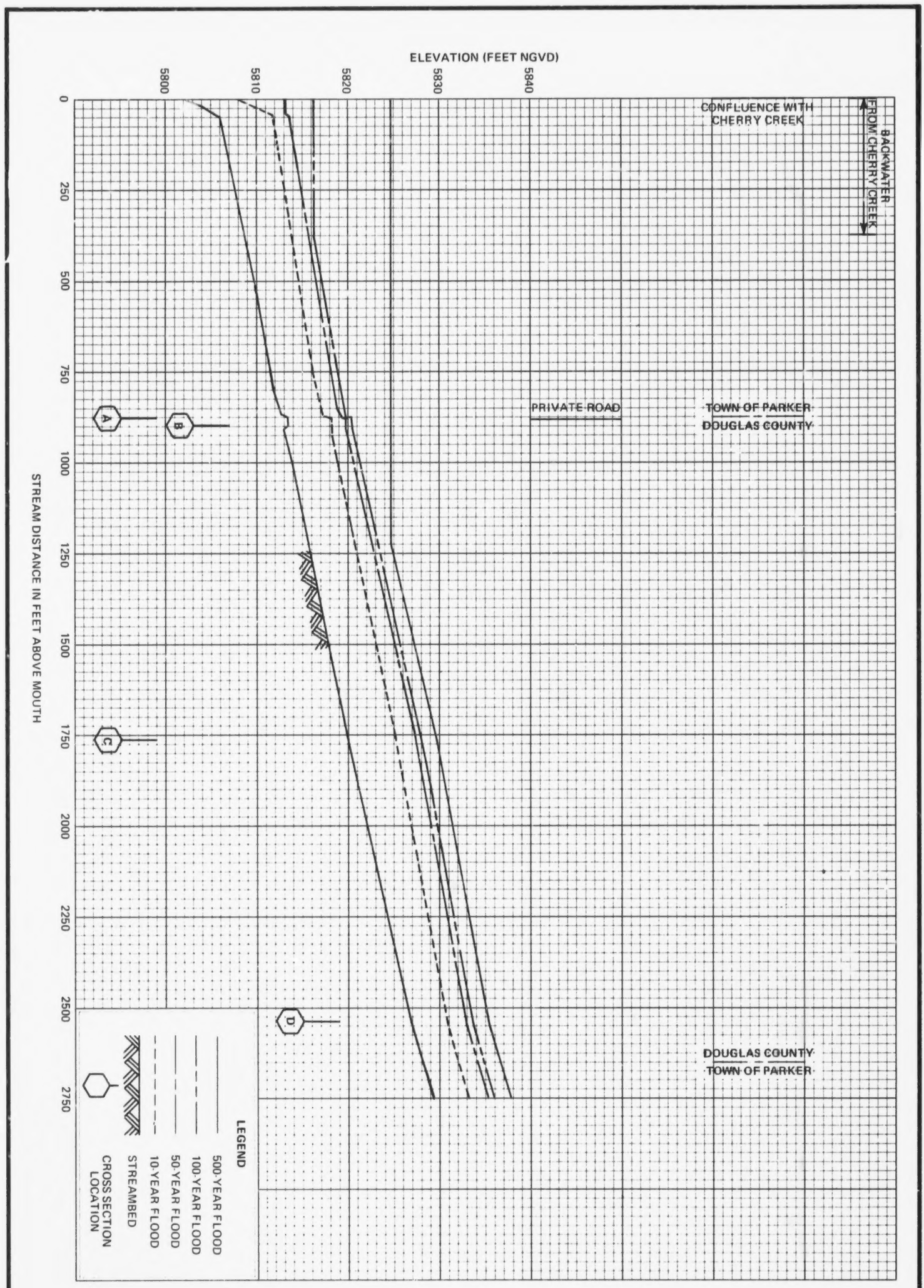
FLOOD PROFILES

CHERRY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

06P



07P	FEDERAL EMERGENCY MANAGEMENT AGENCY TOWN OF PARKER, CO (DOUGLAS CO.)	FLOOD PROFILES SULPHUR GULCH

FLOOD PROFILES

SULPHUR GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

08P

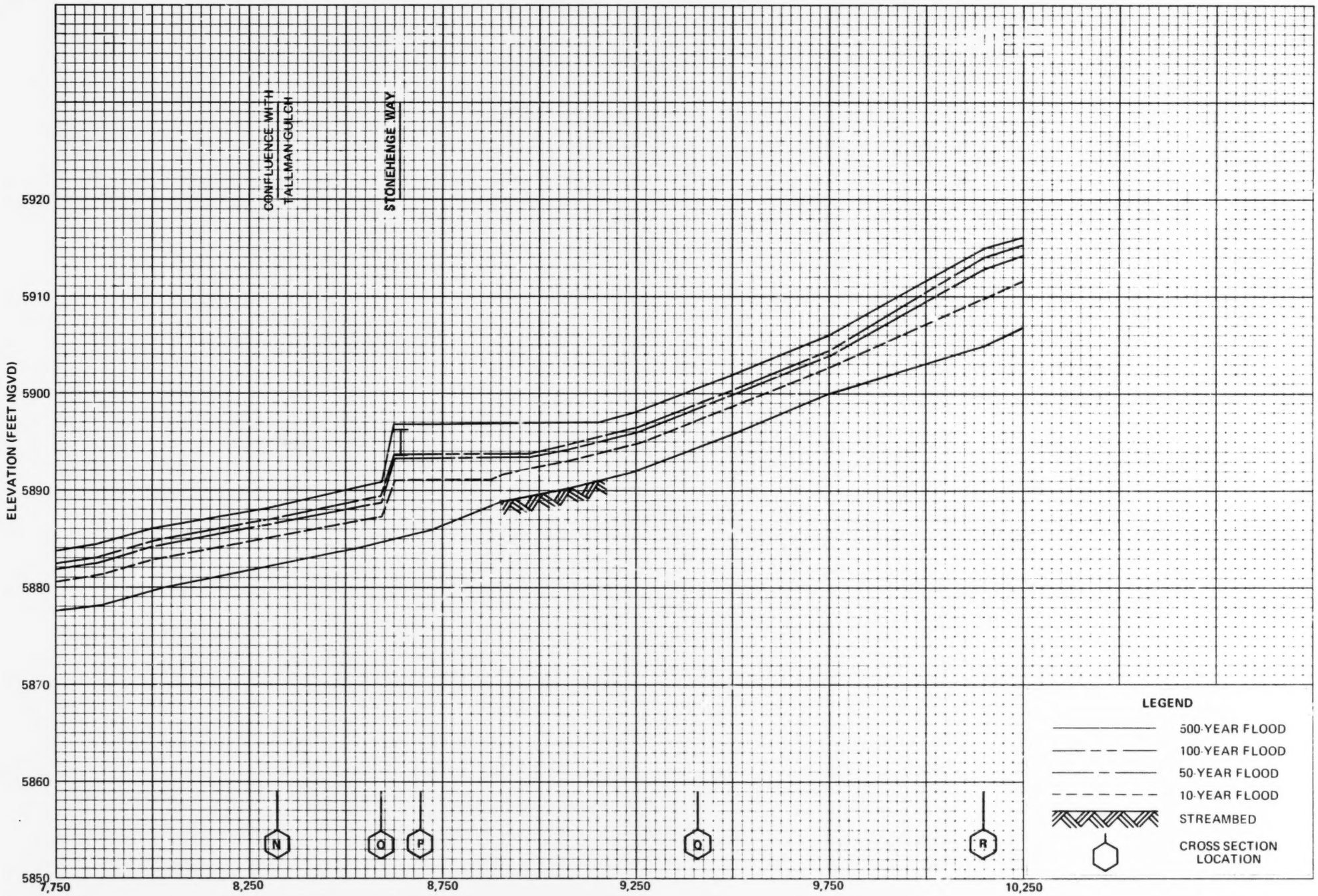
FLOOD PROFILES

SULPHUR GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

09P



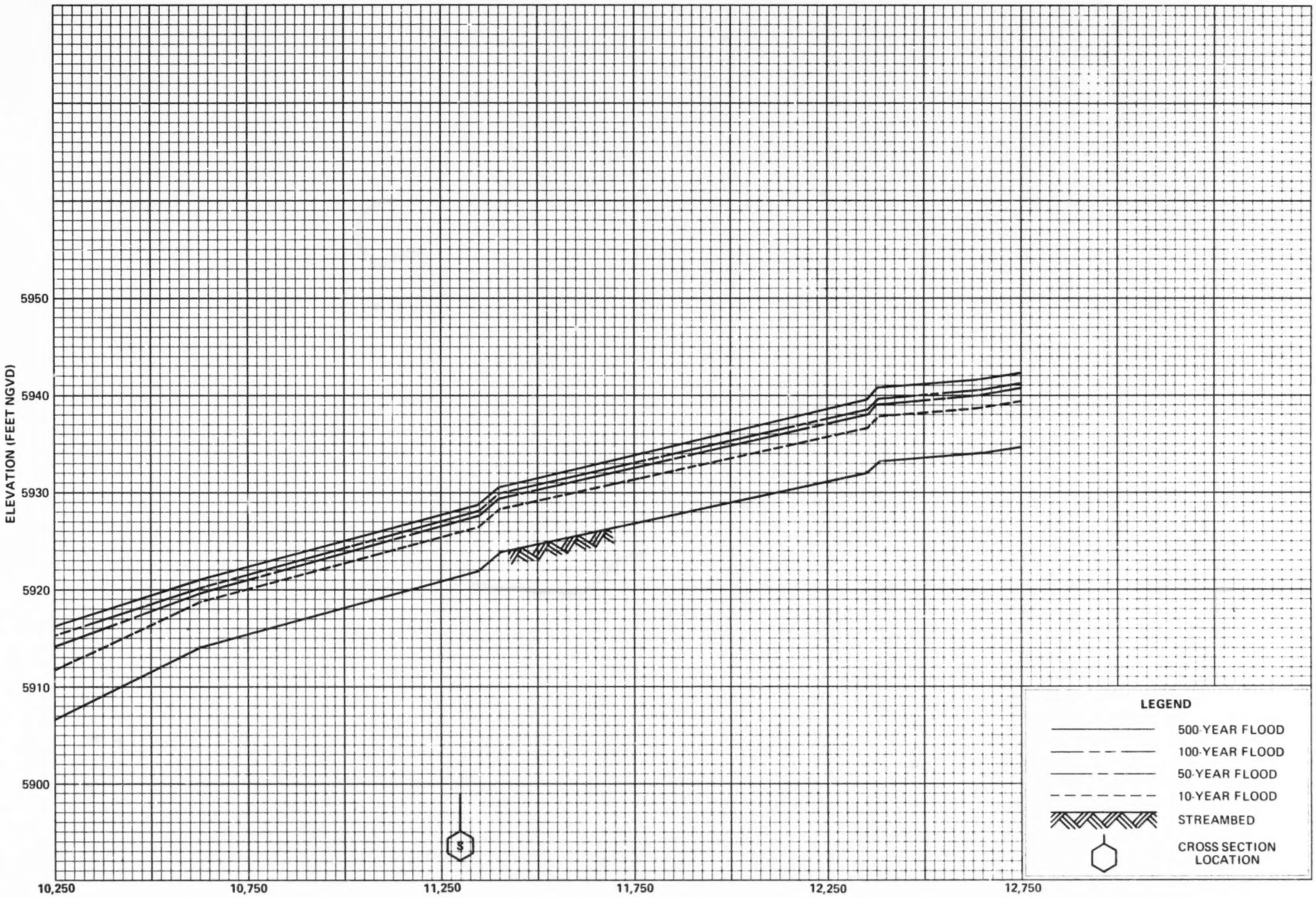
FLOOD PROFILES

SULPHUR GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

10P



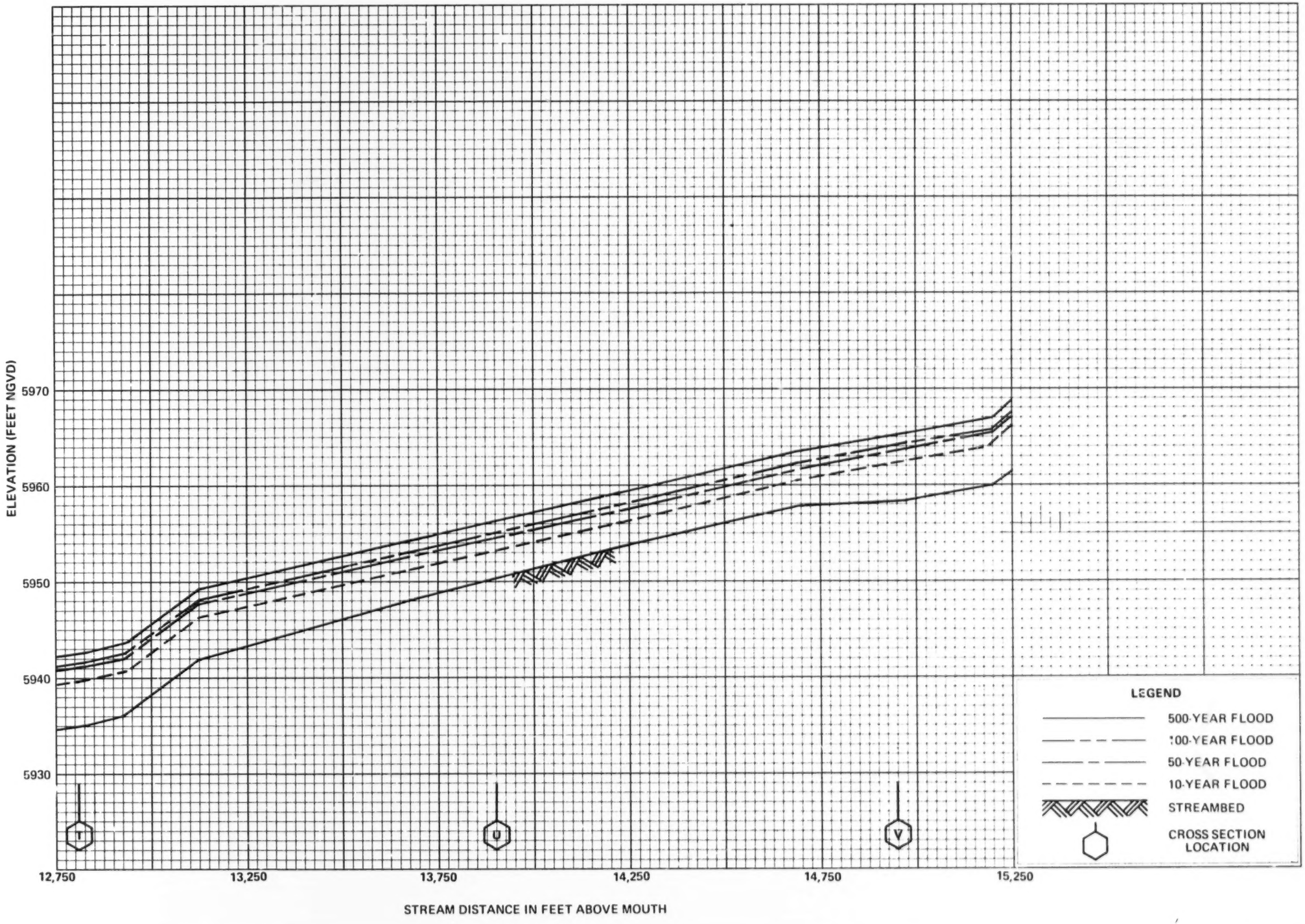
FLOOD PROFILES

SULPHUR GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

11P



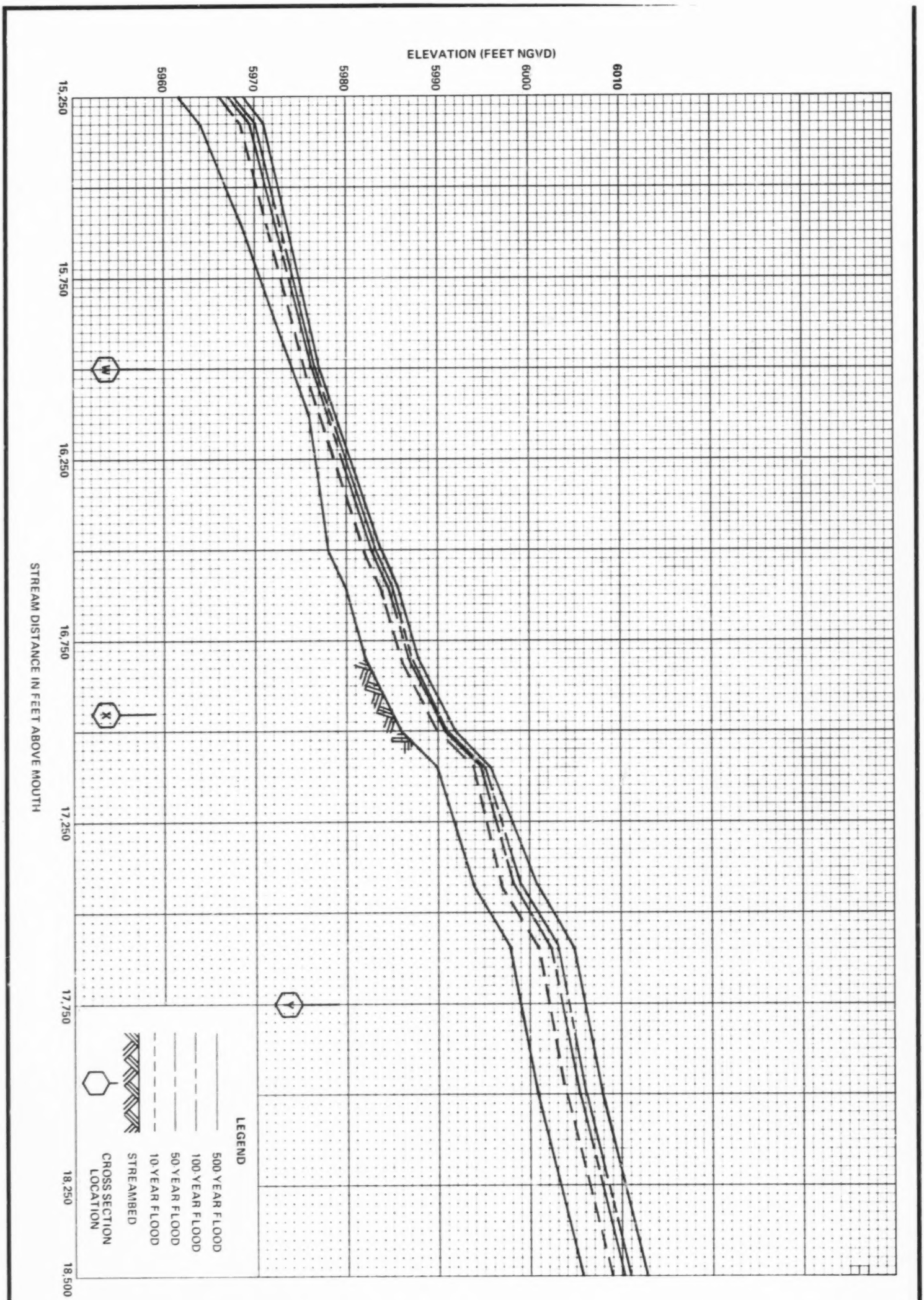
FLOOD PROFILES

SULPHUR GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

12P



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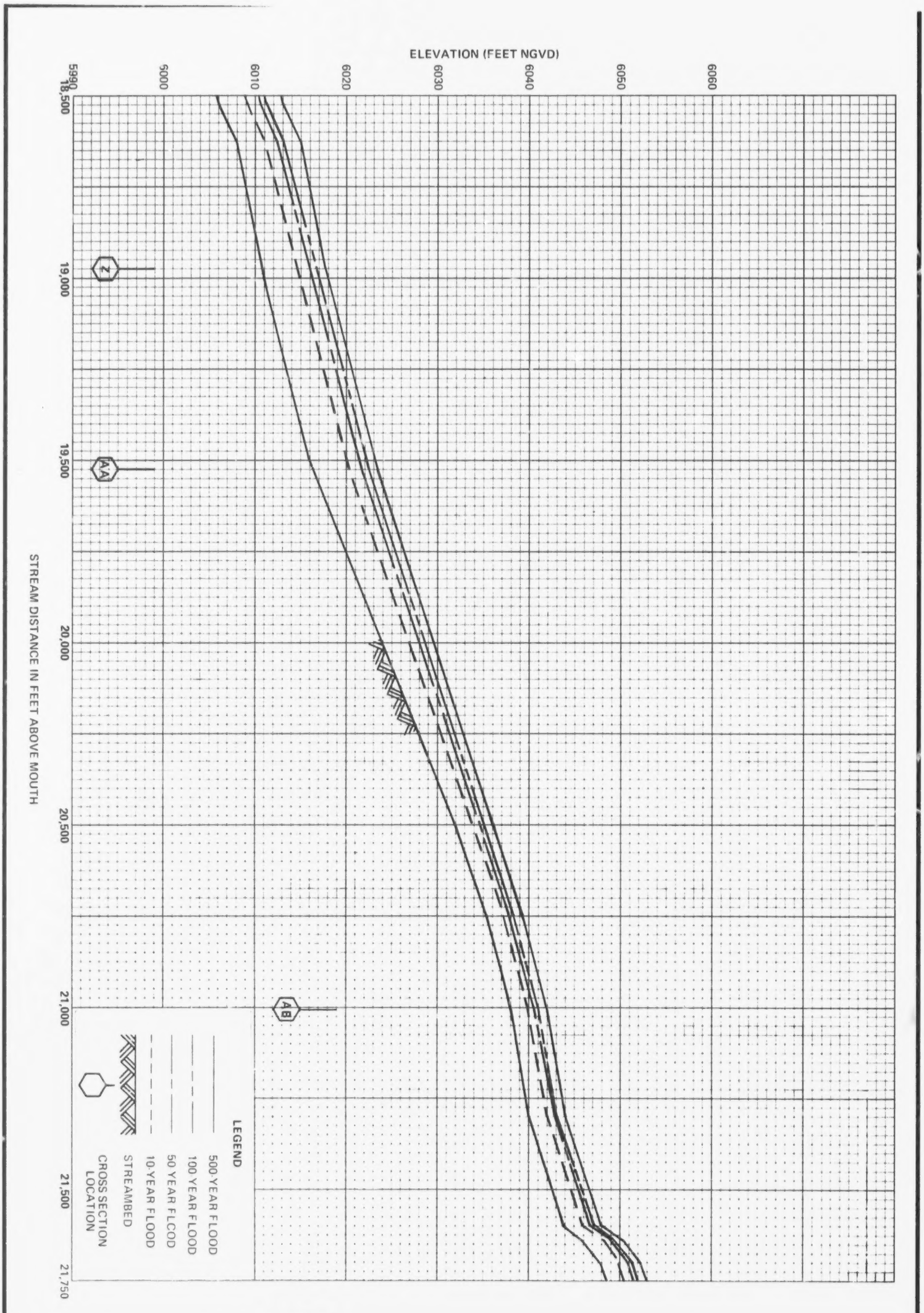

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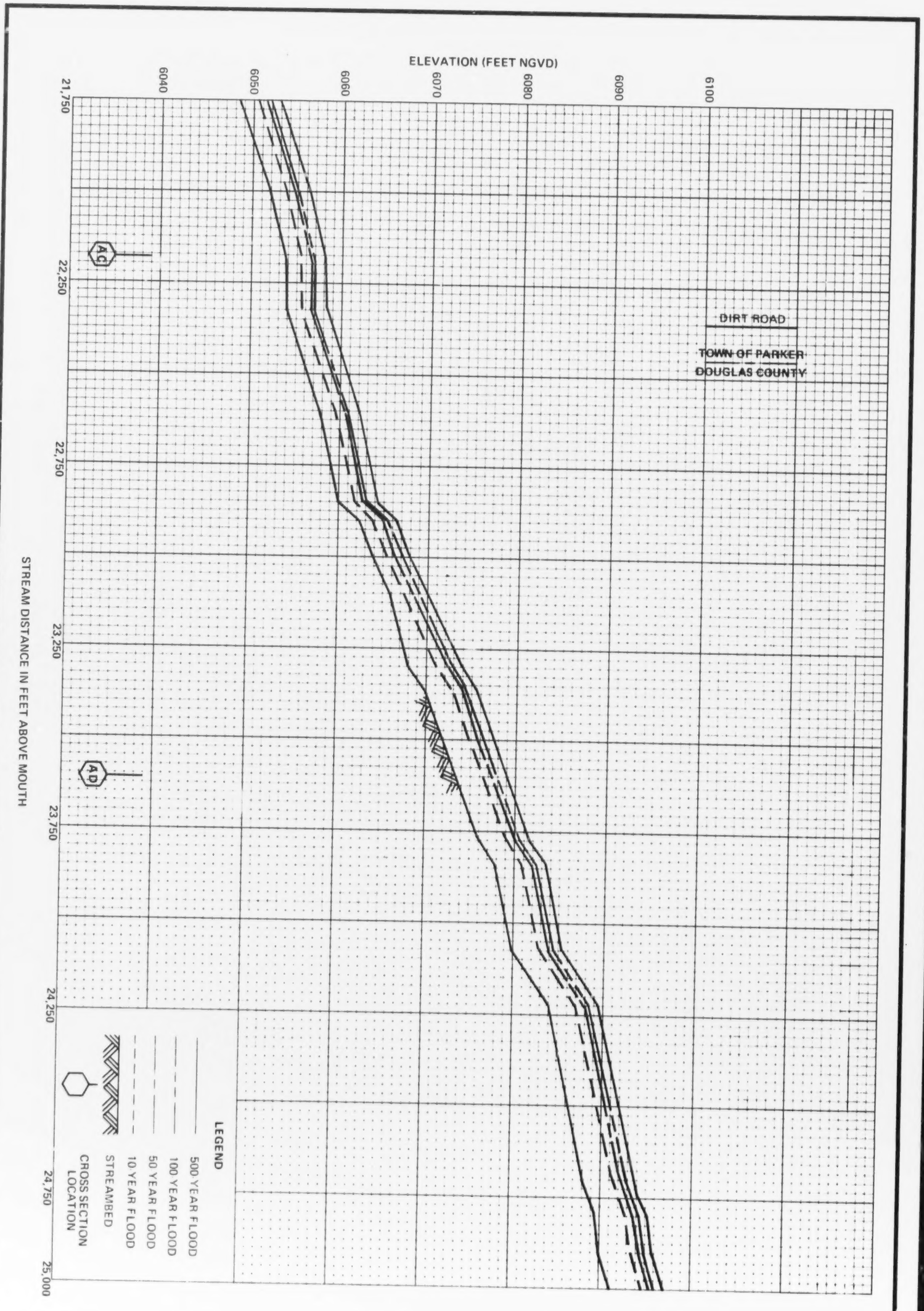

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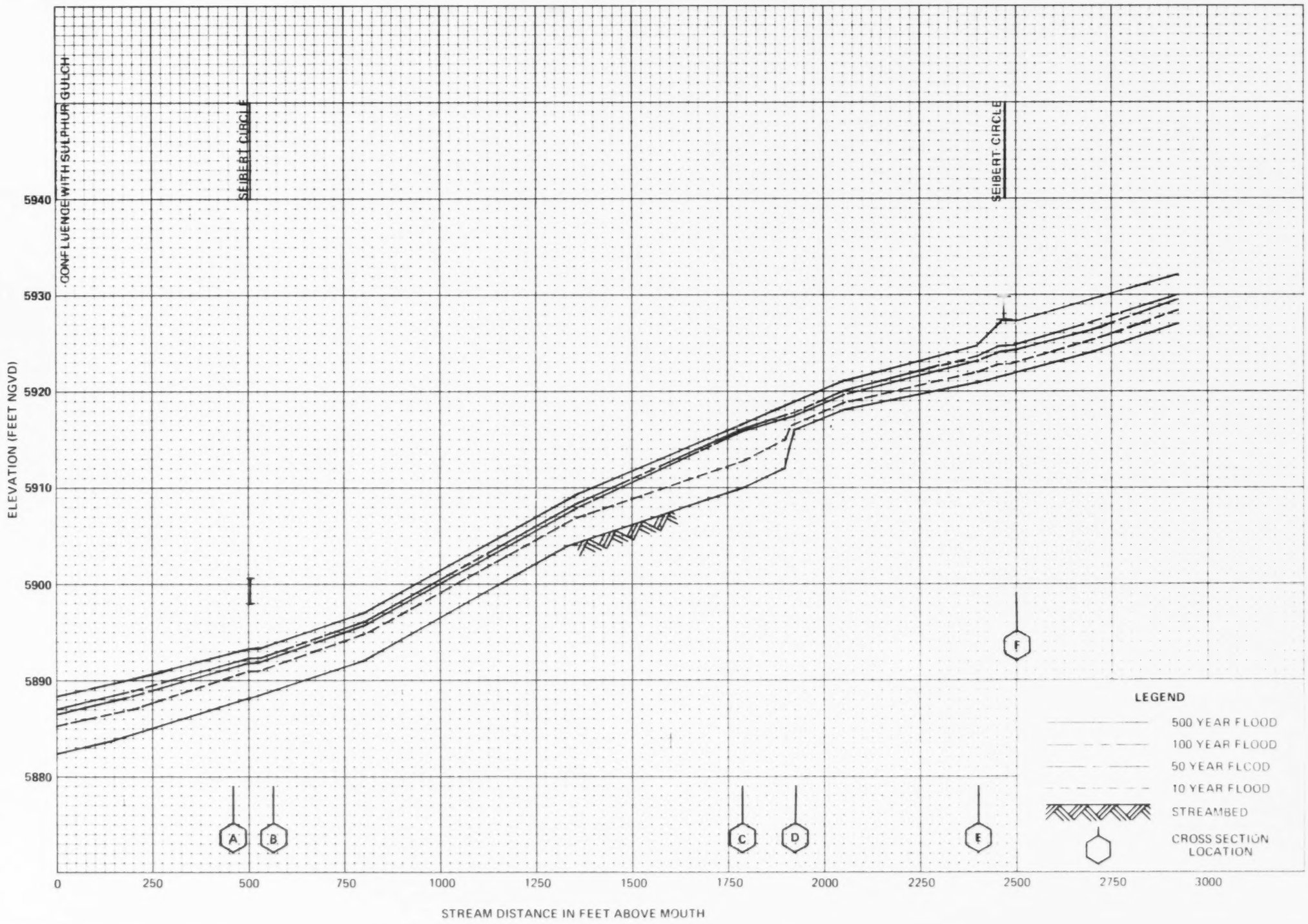


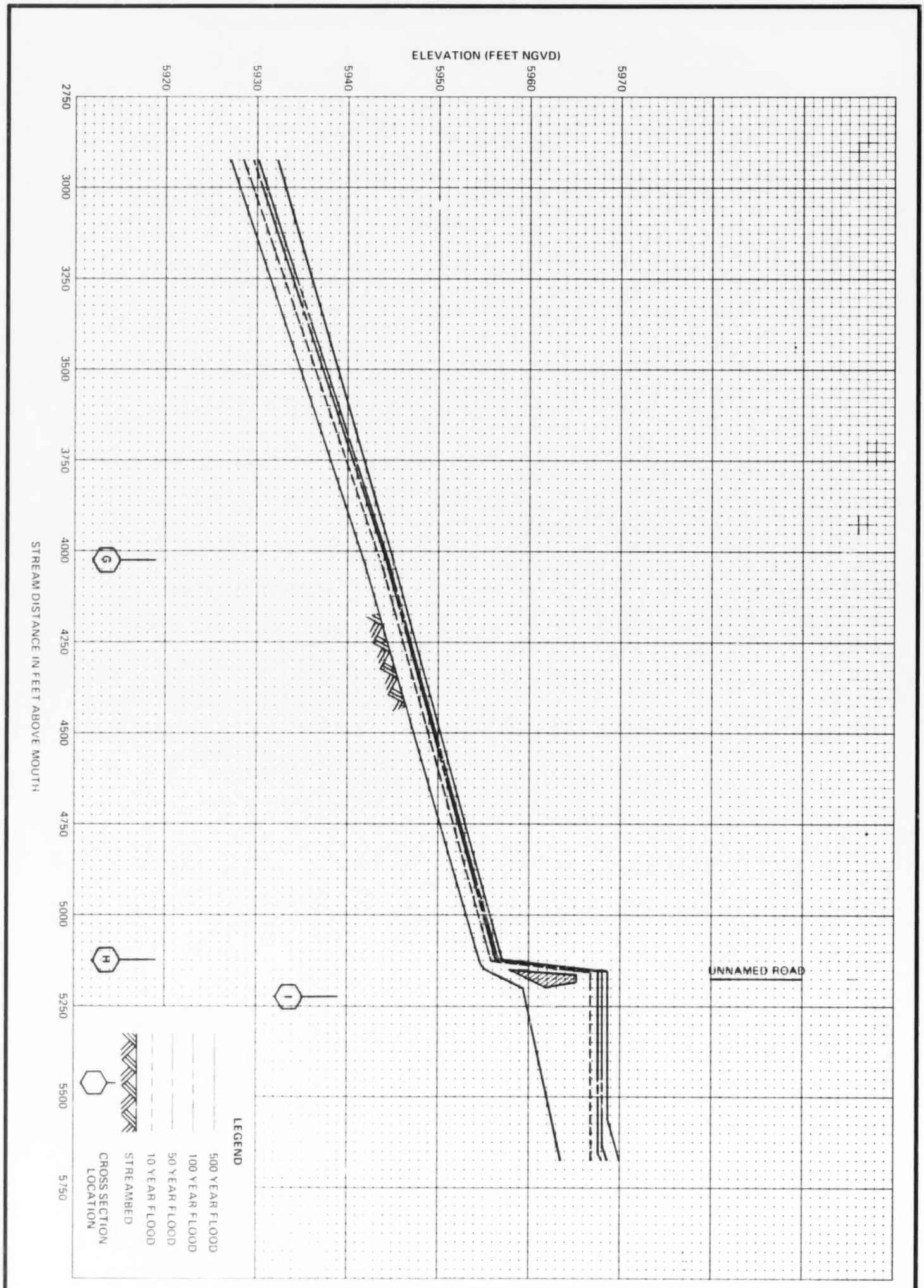
FLOOD PROFILES

TALLMAN GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

16P



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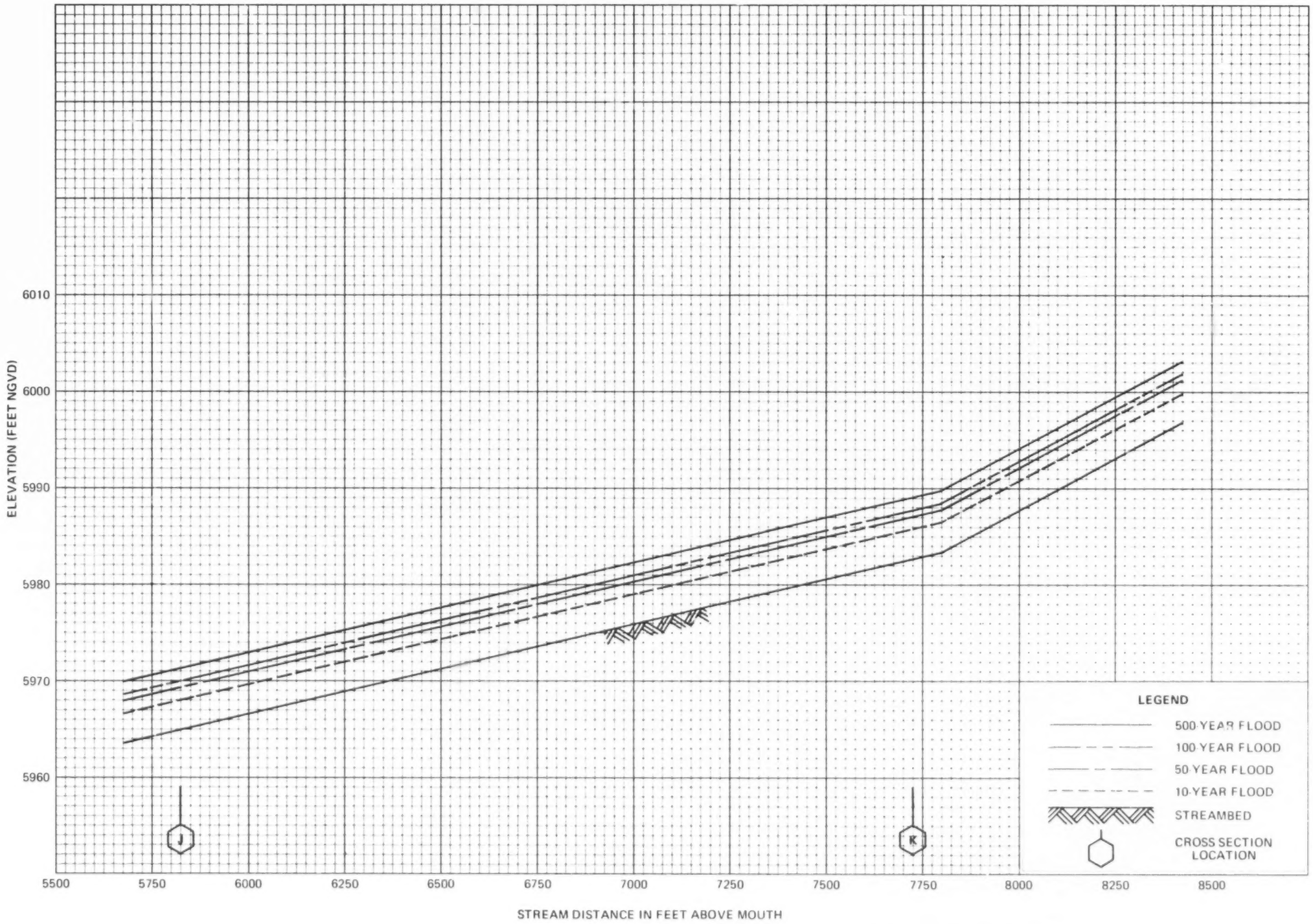


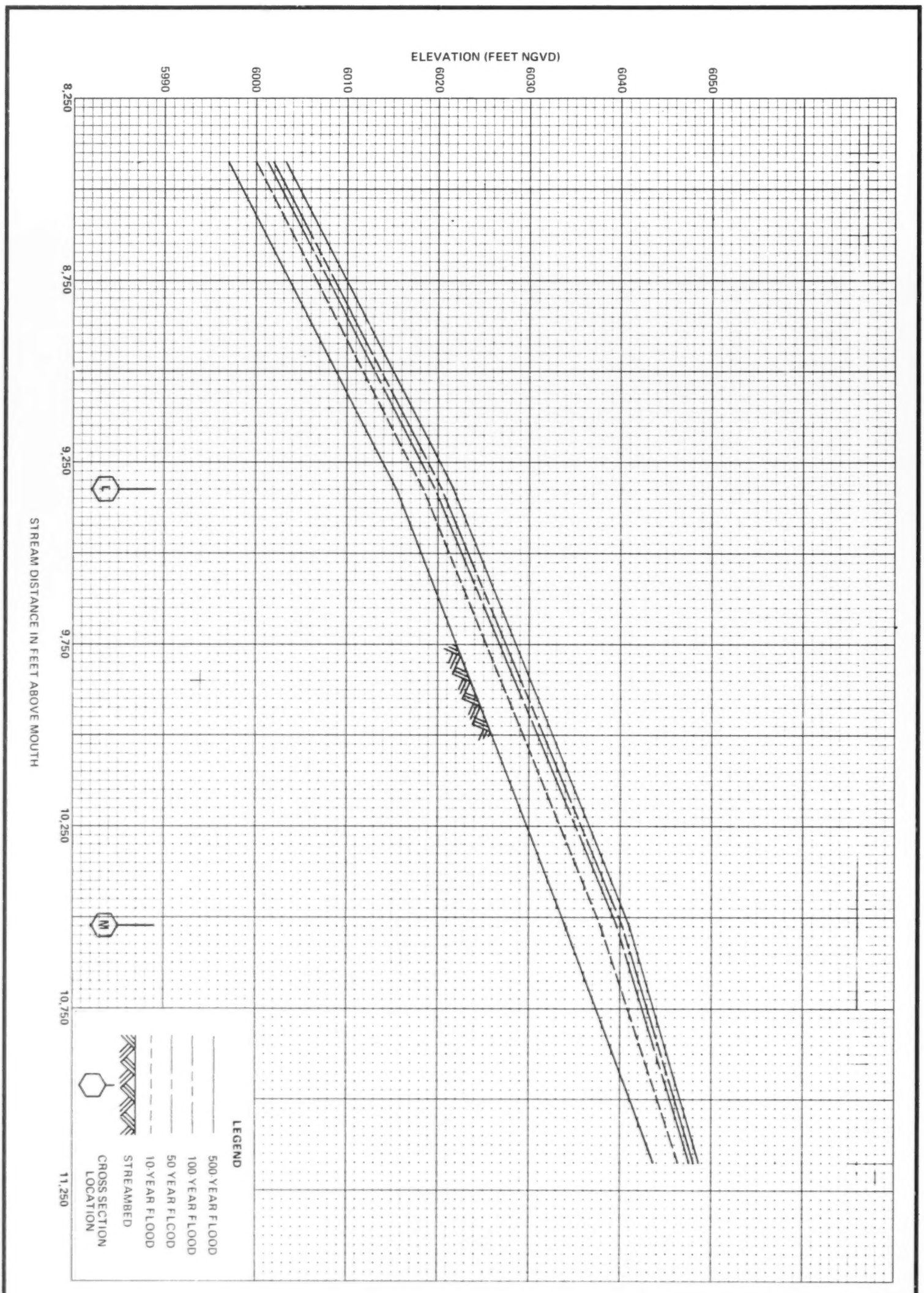
FLOOD PROFILES

TALLMAN GULCH

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF PARKER, CO
(DOUGLAS CO.)

18P



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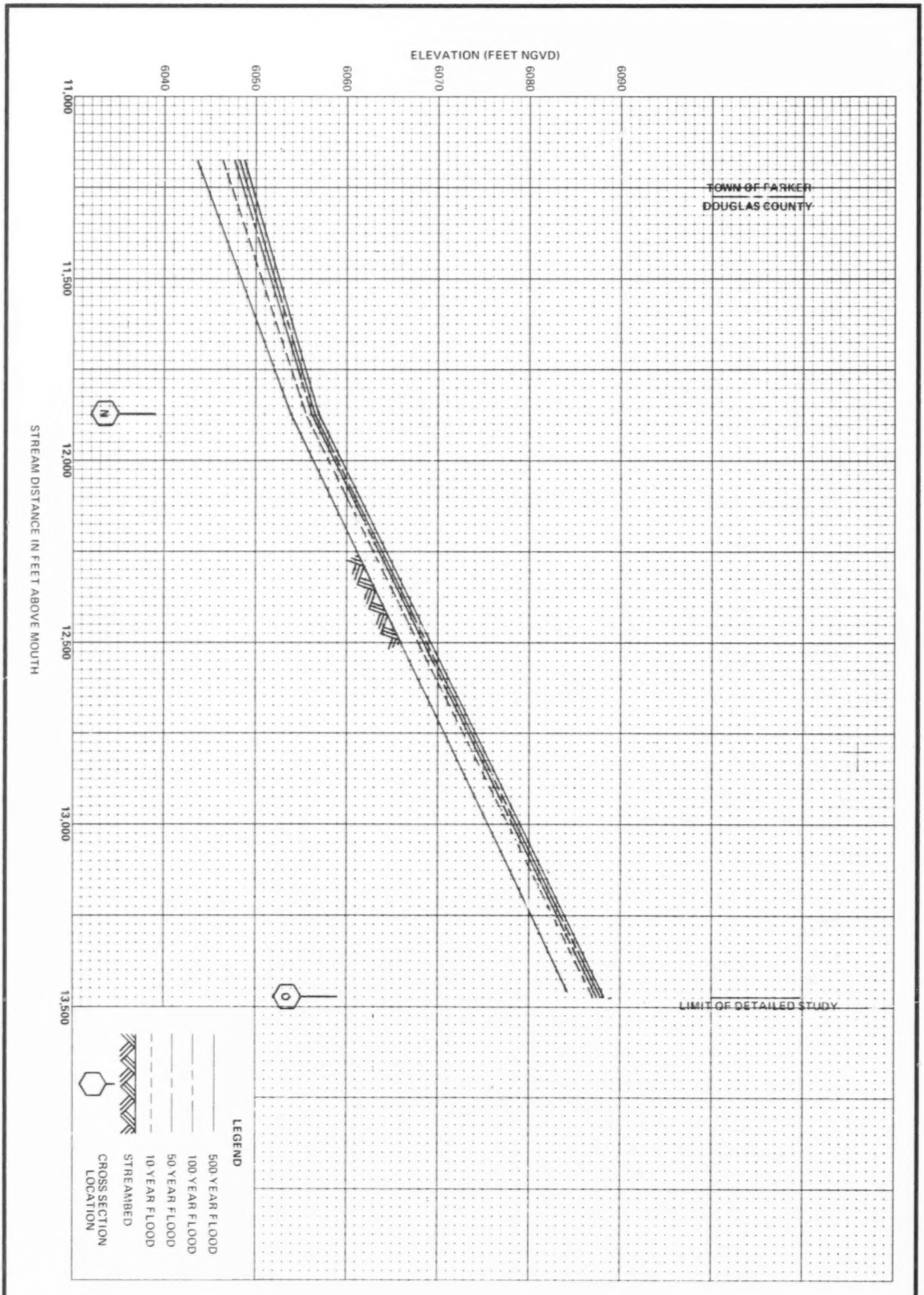

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